Site-Specific Brownfields Sampling, Analysis, and Monitoring Plan (SAMP)

Brownfields Assessment Demonstration Pilot
South Troy Brownfields, New York

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The attached U.S. EPA Region 2 Site-Specific Brownfields Sampling, Analysis, and Monitoring Plan (SAMP) has been submitted in compliance with the provisions of the South Troy Brownfields Assessment Demonstration Pilot Cooperative Agreement No. BP982367-01.

The undersigned agrees to follow the accompanying Generic Brownfields Quality Assurance Project Plan (QAPP) boilerplate to prepare site-specific SAMPs using this template for remedial pilot projects funded under the U.S. EPA Region 2 Brownfields Economic Re-Development Initiative. The undersigned also agrees to incorporate any comments provided by their governing state environmental regulatory authorities (NYSDEC or NJDEP) concerning the development of site-specific SAMPs.

Municipal Brownfields Pilot Project Manager Concurrence: ______________________

Signature

____

Printed Name/Date

U.S. EPA Region 2 Project Manager Approval: ______________________

Signature

____

Printed Name/Date

and when applicable

State/Commonwealth Project Manager Approval: ______________________

Signature

____

Printed Name/Date

U.S. EPA Region 2
Site-Specific Brownfields Sampling, Analysis, and Monitoring Plan (SAMP)

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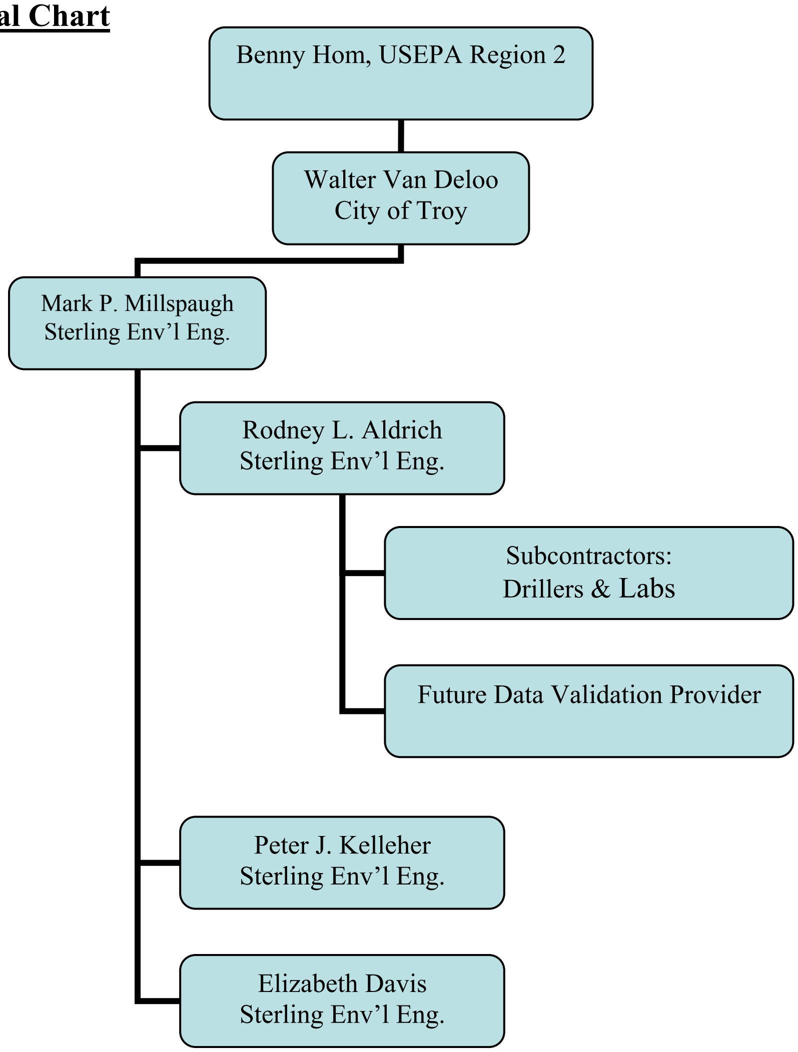
B.0 Project Organization and Responsibilities

• USEPA Review and Oversight	Benny Hom
• City of Troy Review and Oversight	Walter Van Deloo, P.E.
• Overall Project Coordination	Mark Millspaugh, P.E.
• Overall QA	Rodney Aldrich, P.E.
• Systems Auditing	Rodney Aldrich, P.E.
• Performance Auditing	Rodney Aldrich, P.E.
• Sampling Operations	Rodney Aldrich, P.E.
• Sampling QC	Peter Kelleher, P.E.
• Laboratory Analyses	Laboratory to be Selected
• Laboratory QC	Peter Kelleher, P.E.
• Data Processing Activities	Elizabeth Davis
• Data Processing QC	Peter Kelleher, P.E.
• Data Quality Review	Validator to be Selected

B.1 Organizational Chart



B.2 Personnel Information

- Benny Hom
  Brownfields Project Manager
  United States Environmental Protection Agency
  290 Broadway, 18th Floor
  ERRD/PSB
  New York, New York 10007-1866
  (212) 637 - 3964

  Mr. Hom will represent the United States Environmental Protection Agency in its review and oversight function, in its financial sponsorship, and as ultimate arbiter on technical matters.

- Walter Van Deloo, P.E.
  EPA Brownfields Pilot Grant Administrator
  City of Troy
  City Hall
  1 Monument Square
  Troy, New York 12180
  (518) 270-4577

  Mr. Van Deloo will represent the City in the review and oversight of the project, will interact with the media and the citizens, and will provide a point of contact for acquiring City services and permissions at City owned sites.

- Mark P. Millspaugh, P.E.
  Project Coordinator
  Sterling Environmental Engineering, P.C.
  One Columbia Circle
  Albany, New York 12203
  (518) 456-4900

  Mr. Millspaugh will oversee the project, provide quality control on documents and determinations, and will mentor the daily manager of the project, Mr. Rodney Aldrich.

- Rodney L. Aldrich, P.E.
  Project Manager
  Sterling Environmental Engineering, P.C.
  One Columbia Circle
  Albany, New York 12203
  518/456-4900

  Mr. Aldrich will manage the project on a daily basis including bidding for subcontractors, management of subcontractors, management of field supervision and sampling efforts.

- Peter J. Kelleher, P.E.
  Quality Assurance Officer and Field Sampling Supervisor
  Sterling Environmental Engineering, P.C.
  One Columbia Circle
  Albany, New York 12203
  518/456-4900

  Mr. Kelleher will ensure contractor and subcontractor compliance with the Quality Assurance Project Plan (QAPP), SAMP, and Health and Safety Plan. Additionally, Mr. Kelleher will conduct and supervise the sampling effort in the field.

- Elizabeth Davis
  Staff Geologist
  Sterling Environmental Engineering, P.C.
  One Columbia Circle
  Albany, New York 12203
  518/456-4900

  Ms. Davis will supervise soil probes and will assist the Project Manager during all field activities.

B.3 Laboratory Information

Laboratory Name & Address[1]	Contact & Telephone Number	Sample Analyses
Labs will be selected after approval of the SAMP and this information will be provided to the USEPA as soon as known.		

[1] Demonstration of a laboratory's capability, with respect to their ability to analyze selected contaminants, should be ascertained whenever possible. One approach to rendering such a determination is to obtain Performance Evaluation (PE) results for any pertinent analyses from an ongoing State or Federal monitoring program. If no applicable PE results are available, method control samples containing the analytes of interest at the concentration levels of concern could be submitted prior to initiating the project for pre-qualification. Alternatively, an on-site audit or a quality assurance (QA) management plan review may be sufficient mechanism means to assess a laboratory's ability.

C.0 Site Background

This section contains the Historical Data Review and the Site Reconnaissance Reports. These reports are extractions from the Phase I Brownfields Site Assessment Report that is entitled the Environmental Planning and Research Report dated July 26, 2000 and from information obtained in subsequent site visits performed by Sterling Environmental Engineering, P.C. (STERLING).

The Phase I Brownfields Site Assessment was completed for approximately 54 parcels in an area from Congress Street at the north to the Troy City Line at the south and from the Hudson River on the west to approximately 1st Street on the east.

After public input, task force input, ranking, and careful consideration, three sites have been selected by the City of Troy for Phase II sampling. These are:

1. An Area Of Concern (AOC) consisting of the Former Scolite Property (owned by City of Troy);
2. An AOC consisting of a 6 acre area within land owned by the Rensselaer County Industrial Development Authority; and,
3. An AOC consisting of the northernmost King Fuels property, which was designated Site 43 in the Phase I Brownfields Site Assessment Report.

C.1 Historical Data Review Report

C.1.1 Former Scolite Property

The Former Scolite Property was originally a foundry.

Sanborn Fire Insurance Maps

The July 26, 2000 Environmental Planning and Research (EPR) Report prepared by STERLING includes a review of the Sanborn Fire Insurance Maps containing the following excerpts:

Map of City of Troy dated 1869:

In the block just south of the Poesten Kill along the shore of the Hudson River is the area occupied by the Rensselaer Iron Works.

Sanborn Fire Insurance Co. Maps dated 1888:

In the area from the Poesten Kill Canal extending south to Madison Street is a facility labeled “Albany Rensselaer Iron Works”.

Sanborn Fire Insurance Maps dated 1904 and updated to 1930:

Between the Poesten Kill and Madison Street, just east of the Hudson River and west of the railroad tracks, is a building labeled "Ludlow Valve Manufacturing Co."

Sanborn Fire Insurance Maps dated 1955 and updated to 1961:

Between the Poesten Kill and Madison Street, just east of the Hudson River and west of the railroad tracks, is a building labeled "Ludlow Rensselaer Valve Foundry".

Aerial Photographs

The July 26, 2000 EPR Report included reviews of aerial photographs of the study area for the years 1952, 1968, 1970, 1971, 1974, 1978, 1982, 1986, 1990, 1991 and 1999 that included the former Scolite Property.

In the aerial photograph taken in 1952, in the first block south of the Poesten Kill, the foundry of the Ludlow Rensselaer Valve Company was visible as depicted in the Sanborn Fire Insurance Co. map of 1955.

In the aerial photographs for subsequent years, the site did not observably change until the barges for loading of scrap metal became visible in 1999.

Interviews

The EPR Report included an interview concerning Hudson Deepwater Development (also known as R. Freedman & Son, Inc.), a tenant of the Former Scolite Property.

Mr. Carmine Casale, South Troy Site Manager of Hudson Deepwater Development, also known as R. Freedman & Son, Inc. (Freedman & Son), was interviewed at the facility on Tuesday, March 14, 2000. Mr. Casale stated that Freedman & Son rents about one acre from Scolite International, and that Freedman & Son uses this facility in South Troy as a transfer facility. Mr. Casale said that shredded scrap metal and sorted scrap metal is brought from the Freedman & Son facility in Green Island to the South Troy location for loading onto barges.

Mr. Casale stated that the facility has gone through a lot of efforts to satisfy the City of Troy regulators. He stated that Freedman & Son has put a solid fence around the solid waste dumpster, paved portions of the property to keep the truck tires cleaner, installed and painted a structural concrete block wall, and installed a chain link fence at the southwestern corner of the facility with a locked gate to control access. Mr. Casale pointed out that when trucks are entering the facility, the scale operator is tasked to go out and check the road for metal debris that may have fallen off a truck.

Mr. Casale also stated out that the fuel oil tank for the facility was aboveground and located on the upper level in the yard, set back from the shore-wall and the Hudson River. He stated that State and City regulators reported this was important so that, in the unlikely event of a spill, there is no slope leading the spill into the Hudson River, therefore there would be room for containment activities and devices.

Site Inspection

During the January 24, 2003 site inspection, STERLING ascertained that one of the past tenants was a roofing company. One of the present tenants cuts and chips wood. Another of the present tenants manages scrap metal and loads it onto barges for shipment. This tenant is known as Hudson Deepwater Development and has managed scrap metal on the site for approximately 6 years.

C.1.2 County IDA Property

Site Inspection

The following is an excerpt from the Site Reconnaissance section presented in the July 26, 2000 EPR Report:

> "The Rensselaer County IDA property is the site of the former Republic Steel. Much of the soil on the property has slag from the steel making process that has been placed there as fill."

Interviews

The following are excerpts from the Interviews section in the July 26, 2000 EPR Report:

Elaine Zuk

Ms. Elaine Zuk of the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation, Bureau of Hazardous Site Control, was contacted on March 23, 2000 regarding the Republic Steel Property.

This site is currently on the NYSDEC list of Hazardous Substance Waste Disposal Sites. The site was listed due to groundwater contamination. The listing indicates that hazardous substances disposed at the site include chromium, lead, arsenic, cyanide and copper. Ms. Zuk was not aware of any current actions taken by the State at this property. However, she indicated that if the Hazardous Substances Program is formalized in the future, further State action may be taken.

Sanborn Fire Insurance Maps and Map of William Barton

STERLING reviewed the Sanborn Fire Insurance Maps and a map of William Barton and ascertained the following:

Map of City of Troy dated 1869 (Produced by William Barton)

The County IDA Property is indicated as vacant with proposed lot subdivisions.

Sanborn Fire Insurance Co. Maps dated 1888

The County IDA Property is in the area between the Wynants Kill and Monroe Street that is labeled "Burden Iron Works".

Sanborn Maps dated 1904 and updated to 1930

The County IDA Property is north of the building complex labeled "Hudson Valley Fuels" and is also northwest of the complex labeled "The Burden Iron Works", and is crossed by multiple railroad sidings that travel approximately north-south.

Sanborn Maps dated 1955 and updated until 1966

The County IDA Property is north of the complex of the Republic Steel Corporation, is labeled as containing slag piles, and is crossed by multiple railroad tracks or sidings that travel approximately north-south.

The main complex of the Republic Steel Corporation is approximately 200 feet directly to the south and includes a wash room, power house, ore shed, cast house, boiler house, and sludge pits. However, this complex is side-gradient of the subject site. Rail sidings in a fan shape with 6 spurs are placed on the adjoining property to the southeast and extend away from the subject site toward the southeast. The adjoining property to the east of the subject site is vacant and abuts the railroad tracks to the east. The adjoining property to the north contains slag piles.

Aerial Photographs

The EPR Report included a review of aerial photographs of the study area from the years 1952, 1968, 1970, 1971, 1974, 1978, 1982, 1986, 1990, 1991 and 1999 that included the County IDA Property.

The aerial photographs from 1952 through 1974 are in conformance with the Sanborn Maps and known usage of the subject site by Republic Steel. As early as 1978, evidence of the removal of Republic Steel was visible, with nearly total removal by 1982. The development of the jail to the north of the subject site became apparent by 1991.

C.1.3 King Fuels North / "The Alamo" (Site 43)

Sanborn Fire Insurance Maps and Map of William Barton

The following excerpts are a combination of extracts from Section 5.3 "Historical and Sanborn Fire Insurance Maps" in the EPR Report and from information obtained from recent re-inspections of said maps:

Map of City of Troy dated 1869 (Produced by William Barton)

Main Street is visible extending from Greenbush Road (present day Burden Avenue/4th Street) toward the Hudson River, north of the Wynants Kill. The subject site is in the northwest corner of the intersection of the railroad and Main Street. The site is indicated to be vacant. The closest buildings are residences approximately a half block east of the railroad.

Sanborn Fire Insurance Co. Maps dated 1888

The subject site has a railroad line on both its east and west sides that run approximately north-south. Between the railroad lines is a long rectangular building that is labeled to be part of the Burden Iron Works. The use is not labeled.

The Burden Iron Works rolling mill is shown south and southwest of the subject site.

Sanborn Maps dated 1904 and updated to 1930

There is a building that is part of the Burden Iron Company facilities. The building has a rectangular footprint and is situated adjacent to the railroad with its long axis running approximately north-south.

The west side of the building is labeled "Iron Wire Headquarters" and the east side is labeled "Pattern Storage 2nd". On the western portion of the subject site are two curved rail sidings.

On the adjacent property to the west, there is a large building of the Burden Iron Company that has internal rooms or areas labeled as foundries, machine shop, boiler room, test room, core ovens, tool room, eng. & drawings, eng. dft., and, in the northeast corner, brass foundry. The Burden Iron Company headquarters property is toward the north of the subject site. The east side of the subject site is the railroad and the properties to the south are developed as warehouses.

Sanborn Maps dated 1955 and updated until 1966

The subject site has a circle near its center labeled "Republic Steel Co. Fuel Oil Tk." and is labeled as 38 feet high. From aerial photographs this structure is known to have been a cylindrical tank resting on its circular end. Surrounding the tank is a 10 foot high concrete wall in a rectangular shape with its long axis oriented north-south. In the southwest corner of this wall is a small slab that is labeled "Oil Pump HO" (House). A 6 foot wire fence has been placed along the railroad, which is now labeled "N.Y.C.R.R". The remainder of the subject site is depicted as vacant.

The main complex of the Republic Steel Corporation is approximately 200 feet directly to the west with its ore shed, cast house, power house, boiler house, and sludge pits. However, this complex is downgradient of the subject site. Rail sidings in a fan shape with 6 spurs extend toward the subject site from northwest of the site but terminate approximately 100 feet from the subject site. The east side of the subject site is the railroad and the properties to the south are developed as warehouses.

Aerial Photographs

The EPR Report includes a review of aerial photographs of the study area from the years 1952, 1968, 1970, 1971, 1974, 1978, 1982, 1986, 1990, 1991 and 1999 that included the King Fuels North / "The Alamo" (Site 43). The information learned from these photographs is summarized below.

The aerial photograph review confirmed that, although most of the Republic Steel Facility was removed by 1982, the fuel oil storage tank at the King Fuels North / "The Alamo" site remained there in 1982 and 1986. However, by 1990 the fuel oil storage tank had been removed. In the 1991 photograph, an opening in the center of the western containment wall was visible.

C.2 Site Reconnaissance Reports

The following sections are provided as per the U.S.EPA Region 2 Generic Brownfields QAPP boilerplate.

C.2.1 Former Scolite Property

The EPR Report prepared by STERLING states the following in the Site Reconnaissance section with regard to the subject property:

Hudson Deepwater Development, also known as Freedman & Son, Inc., has been renting approximately one acre of property from Scolite International for approximately four (4) years.

There is a vehicle scale at the northeast portion of the rental property in line with the entrance. Immediately west of the scale is a warehouse-type building that contains an office. The building has access to water and sewer, but Hudson Deepwater Development also has a portable toilet on site for sanitary wastes.

North of the warehouse an open yard area contains two scrap tanker trailers. There is a small (estimated 400 gallon) aboveground tank on the outside northern side of this building which reportedly contains fuel oil. Minor soil staining is noted near the 400-gallon tank. Approximately, seven (7) empty drums are also observed in the yard. One contains miscellaneous solid waste. There is a cement truck and several trucks and vans on the eastern side of this lot. These do not appear to be in use and are being stored on site. Toward the northern side of the open yard there is a six (6) foot high pile of asphalt material. Immediately east from this pile is an enclosed area which contains a dumpster for municipal solid wastes generated at the site.

This yard has a wall made of large concrete blocks that runs parallel to the Hudson River, which allows the grade to transfer down from the height of the scale and upper yard area, to an area at the level of the shore-wall. This block wall also protects the Hudson River, and partially the Poesten Kill, from the steel scrap stockpiled behind it to the east from tumbling into these water bodies. However, during the inspection, scrap metal was stacked on the lower level as well, but there was an empty buffer between the stacked metal on the lower level and the shore-wall, along the Hudson River.

The scrap metal piles along the shore of the Hudson River and the Poesten Kill are piles of shredded scrap metal, and disassembled scrap metal components.

The pile toward the north consists of I-beams and other structural steel. This pile was observed to have one scrap reddish color tank that Mr. Casale, South Troy Site Manager of Hudson Deepwater Development, explained was segregated out to be returned to Freedman & Son's Green Island facility. The end port of one end of this red tank had been removed.

The pile toward the south contains smaller non-structural, non-shredded steel that is stacked between the warehouse and the shore wall. There is a new six-foot high chain link fence from the end of the warehouse to the shore-wall. The fence actually extends several feet beyond the shore-wall. There is also a locked gate that controls access at the southwestern corner of the property.

Between the pile of scrap metal to the north and the pile of scrap metal to the south is a minimal amount of shredded steel being loaded into the two barges tied along the shore-wall.

C.2.2 County IDA Property

The EPR Report contained the following in the Site Reconnaissance section for the Republic Steel parcel:

> The former Republic Steel property to the north of the Rensselaer County Jail was visited on March 8, 2000. The property is vacant and contains numerous piles of materials, including what appears to be slag.

C.2.3 King Fuels North / "The Alamo" Property (Site #43)

The EPR Report makes minimal reference to the subject property. Mention is made of the fact that the City contemplated trading the City owned property known as the Sperry Warehouse for the subject property that was referred to as "The Alamo".

Site visits subsequent to the preparation of the EPR Report have shown that the site is presently used for brush and yard waste storage, chipping and composting by the City of Troy. A section of the 10 foot high concrete wall on the western side has been removed, creating an entrance for the trucks that deliver and haul away these materials.

The EPR Report states that the Sperry Warehouse property that is located immediately south of Main Street was investigated by a Phase II Environmental Site Assessment. In Section 3.2.5, "Former Sperry Warehouse", the EPR summarizes the findings of the Phase II Assessment entitled: "Subsurface Investigation Report, City of Troy: Former Sperry Warehouse Site, King Street; May 1999; Prepared for King Fuels, Inc.; Prepared by North American Environmental, Inc."

A subsurface investigation was conducted in March 1999 at the Sperry Warehouse property to assess soil and groundwater quality. The study concluded that fill at this site consists of cinders, iron ores, cobbles, slag, wood fragments, foundry sand, bricks, ashes, and silt. Several petroleum compounds were detected above NYSDEC guidance values in soil. Arsenic was also detected in soils above New York State background levels. Slightly elevated levels of benzene were detected in groundwater from two monitoring wells and petroleum hydrocarbons were detected above standards in one monitoring well.

As the Sperry Warehouse property is immediately south of the subject site, the soil conditions at the Sperry Warehouse may be indicative of soil conditions at the subject site.

C.3 Project Definition

C.3.1 Former Scolite Property

The property was used as a foundry from the mid-1800s to approximately 1969. In 1869, the property was occupied by the Rensselaer Iron Works. By 1888, the property was occupied by the Albany Rensselaer Iron Works. By 1904 and through 1930, the property was occupied by the Ludlow Valve Manufacturing Co. By 1955 and through 1961 the property was occupied by the Ludlow Rensselaer Valve Foundry. These companies all manufactured valves and fire hydrants.

The property was utilized as a roofing company warehouse in approximately the 1990s. From 1999 to 2003, the area near the bulkhead along the Hudson River has been and is presently being used to manage scrap metal prior to loading on barges for shipment. The former maintenance building has been and is presently used to house offices and for minor equipment storage. Also, at present, the foundry building is housing a log sawmill and splitting operation.

Iron and steel fragments may be present but do not represent a source of contamination unless significant amounts have been deposited and then only pose a risk of iron oxide in groundwater. As groundwater is not utilized at the site or by the occupants of any adjacent properties, this is not an environmental issue.

The fact that valves were manufactured with certain bronze parts raises the possibility that lead was present in the bronze. If the bronze parts were manufactured or machined at the facility, then bronze cuttings or dust may have been released into the environment. Bronze can vary in lead concentration but lead concentrations in bronze of 6 to 8 percent are possible (Birmingham Bronze Company, Hueytown, Alberta, Canada: http://properties.copper.org/servlet/com.copper.servlet.CDAPropertiesResultServlet?alloy2=None&alloy3=None&alloy4=None&alloy5=None&alloy6=None&alloy=C93200&property=All&unit_type=Both). At a bronze foundry, lead was found at concentrations up to 47,000 parts per million (ppm) in soils (Record of Decision Amendment, ABEX Corporation Superfund Site, Portsmouth, Virginia; August 1994, prepared by the USEPA). The lead in bronze at this location appears to have built up in the foundry sands and these sands apparently were disposed of on-site and in the neighborhood. The USEPA and the NYSDEC generally become concerned at lead levels above 400 ppm in soils that will be subject to unrestricted use. If bronze releases with associated lead occurred at the former Scolite property, such releases could be present in the building or could be present in the soil at the site. Lead in soils is relatively slow to migrate.

The use of the site as a foundry might have contributed coal dust, fragments, and coal ash, therefore semi-volatile organic compounds (SVOCs) and trace metals derived from coal may be present. If coal releases occurred at this site, such releases could be present in the building or in the soil at the site. These contaminants would be relatively slow to migrate.

After 1930, the presence of the rail spur at the eastern side of the property may have contributed polychlorinated biphenyls (PCBs), as PCBs were sometimes used as hydraulic fluid in railroad devices.

No evidence of oil heat in the foundry building could be detected, which is consistent with the use of the building as a foundry. It would have been heated by the foundry activities during usage.

The maintenance building presently contains an oil furnace and an aboveground oil tank. No evidence was found that an underground tank was ever used to supply this furnace. Due to the size of the building and large access doors, it is likely that this building always had an aboveground tank located internal to the building. The probability is very low that the building had a heating oil supply tank located external to the building. As no stains are present and no reports of a release exist, it is not necessary to sample for petroleum releases with regards to the heating of this building.

The use of the site as a scrap yard for approximately the last six years might contribute a number of contaminants to the facility. These could include heavy metals such as lead from automotive radiators and plumbing solder, mercury from automotive switches, and PCBs from automotive fluff. With regards to PCBs, there is no evidence that automotive fluff was generated or managed at this facility. Petroleum contaminants might be present in used motors and other scrap parts containing oil. The migration route for such releases would be into the soil.

The use of an aboveground tank for the storage of motor fuel oil was noted during the 2000 site reconnaissance. Although the evidence of a release amounted to only minimal staining, its presence increases the need to determine if soils have been contaminated with petroleum.

A review of the Sanborn Maps has shown that the bulkhead position over the decades has moved further west and this movement raises the possibility that fill has been brought to the site and incorporated behind the bulkhead with respect to the Hudson River.

C.3.2 County IDA Property

The County IDA Property was part of a steel manufacturing facility from the mid 1800s to the 1950s.

Two possible contaminants appear to be slag and coal tar. The slag was a by-product of the manufacturing of iron and steel. Slag and dross are the materials in iron ore that sink or float when iron ore is melted. These are commonly referred to as slag. Slag has been shown to contain elevated levels of heavy metals. When the concentrations of such metals found in slag are compared to tables showing the concentration of such metals in New York State soils, arsenic sometimes exceeds the concentrations that are typically found in New York State soils. If arsenic releases associated with iron and steel slag occurred at the Area Of Concern (AOC) at this site, such releases could be present in the soil. Arsenic in soils can leach into subsoils or groundwater, depending on pH and other geochemical factors.

Coal tar has been found on the parcel presently occupied by New Penn, which is part of the subject property. Coal tar is the residual material that accumulated when coal was gasified to make gas for street lamps, etc. The facility that performed this gasification operation locally was located at the property presently owned by King Fuels less than one quarter mile south of the subject site, in the vicinity of the mouth of the Wynants Kill into the Hudson River. Coal tar consists of a mixture of organic molecules, some of which are SVOCs. The coal tar compounds are relatively large organic molecules and, therefore, are not very mobile in soils or soluble in groundwater.

C.3.3 King Fuels North/"The Alamo" Property

This property was near to, or part of, an iron and steel manufacturing facility from the mid 1800s to at least 1930. In the time period from 1904 to 1930, there was a building on the site that on the west side that was labeled as the "Iron Wire Headquarters" and the east side is labeled "Pattern Storage 2nd". Since the facility was an iron producer, presumably iron wire or cable may have been a product. The wire making practice may have occurred in the building. Sometimes drawing techniques for metalworking involve petroleum for lubrication and cooling. The pattern storage presumably refers to the fact that foundries must have patterns for their molds. The building probably was the location of storage of such patterns.

Between 1930 and 1955 the property had a large fuel oil storage tank built upon it.

The three possible contaminants at the King Fuels North/"The Alamo" property appear to be petroleum, slag and coal tar.

Petroleum contamination at the site is possible from the potential spills that may have occurred during the several decades that fuel oil was managed at the subject site.

Slag and coal tar are discussed above with relation to the County IDA property. The proximity of the King Fuels North / "The Alamo" site to the iron and steel making process means that the coal tar and slag waste products could have been deposited at this subject site. However, the likelihood of these slag and coal tar wastes being significant fill in the area is reduced by two factors. First, the Sanborn Maps show that the area was fairly distant from the Hudson River and may not have required fill. Second, filling would have been more difficult after the building was established upon the subject site by 1888 and either buildings or the fuel oil storage tank have been on the site until recent times.

D.0 Data Use Objectives

As per the U.S.EPA Region 2 Generic Brownfields QAPP boilerplate, the following items are the objectives of this SAMP:

- Locating and identifying potential sources of hazardous waste or petroleum contamination (sampling data are used when formulating remediation strategies, and estimating remediation costs).
- In so far as feasible given budget constraints to delineate horizontal and vertical contaminant concentrations, identifying clean areas, estimating volume of contaminated soil, and establishing a clearly defined removal design.
- Determining if there is an impact threat to public health or the environment from hazardous waste or petroleum releases.
- Provide data to assist in determining treatment and disposal options and characterizing soil for on-site or off-site treatment.
- Verifying the attainment of clean-up goals. Ascertaining if additional remediation is required.

D.1 Brownfields Site Investigation Reports

As per the U.S.EPA Region 2 Generic Brownfields QAPP boilerplate:

Upon the completion of the Brownfields sampling project, a Site Investigation Report (SIR) will be submitted. All sampling data will be compared to the NYSDEC TAGM Soil Cleanup Objectives. The report will specify which samples exceed NYSDEC Guidelines for which parameters. The Brownfield SIR will recommend one or more of the following to summarize the environmental condition and recommended actions for the property:

- Further sampling is required.
- Remedial actions are recommended.
- No additional actions are recommended.

The Brownfield SIR will base any of the aforementioned recommendations concerning the property on the collected data and on other data or facts that have been collected on the subject property.

D.2 Quality of Data Needed for Environmental Data Measuring

As per the U.S.EPA Region 2 Generic Brownfields QAPP boilerplate:

The sampling results must be representative of the concentration of contaminants that actually exist at the site that is being studied, as these results will be used to determine potential costly remedial actions. To ensure the accuracy of the results, this Site-Specific Brownfields SAMP is based on the following procedures:

- The available site information is evaluated;
- Suitable geophysical techniques, field screening, and sampling techniques are planned;
- Proper sample collection, preservation, and transport techniques are specified;
- Proper fixed laboratory analyses have been planned;
- Appropriate quality assurance/quality control (QA/QC) samples are specified to be collected and analyzed;
- Plans are made to interpret the geophysical and analytical data; and
- The data usability criteria have been set.

A Photoionization Detector (PID) will be used as a field screening technique to detect likely areas of volatile organic compound (VOC) contamination that may be present. However, at least 20% of the locations where PID negative screening data is obtained will be analyzed at a fixed laboratory for confirmation to minimize the occurrence or impact of false non-detect results in screening data.

This percentage will be raised to 50% for background or "presumed clean" samples with limited deliverables.

D.3 <u>Project Description</u>

D.3.1 <u>Former Scolite Property AOC</u>

The identified possible sources of contamination include:

- bronze dust from bronze metal working,
- lead dust and fragments from paint on scrap metal,
- lead fragments from used vehicle batteries in scrap metal,
- lead from radiator solder in scrap metal,
- mercury from switches in spent automotive scrap metal,
- other metals in miscellaneous scrap metal,
- lead and other metals from spent foundry sand in bronze casting,
- petroleum releases from an aboveground vehicle fuel tank,
- PCBs from railroad machinery hydraulics, and
- Fill brought in to move the bulkhead further west toward the Hudson River.

All these sources could cause surficial soil contamination, except that the management of scrap metal may have disturbed the soil depth several feet with scrap, and the fill behind the bulkhead may be as deep as below the surface of the Hudson River.

Also, the likely future use of this municipally owned property is for greenspace or for the northern satellite location of the Hudson Worldwide River Institute. These uses are not likely to disturb soils at depth. The Hudson Worldwide River Institute appears to be planning to renovate the existing maintenance building for use in various research and instructional activities. These future uses will not involve groundwater usage. In order to establish the greenspace usage, approximately one foot of topsoil will be brought in to support vegetation, as the present soils do not appear to contain much organic matter.

In light of all of the preceding information in this section, borings and surface sampling will be used to obtain soil samples at the subject AOC.

Four borings will be advanced in the area immediately east of the bulkhead that is essentially a shelf of land above the Hudson River yet lower than land to the east. The purpose of these borings is to characterize the soils or fill material that may have been used to fill in the bulkhead area. Soil samples will be collected continuously at 2 foot intervals and the borings will be advanced to the groundwater table, which should be approximately 15 feet below ground surface. Three soil samples will be obtained for analysis at each boring: one near the surface (0 to 2 inches below ground surface), one at the bottom of the boring, and one at the highest PID reading or soil staining between the other two sample locations.

The area immediately east of the first shelf behind a wall that exists toward the east from the bulkhead will be investigated by a backhoe or trackhoe digging a trench. A trench has the advantage of revealing a great deal of information about subsurface conditions. The trench will be dug parallel to the Hudson River in this section of the property. As this area has been managed intensively with scrap metal handling, it is possible that the soil is disturbed for a few feet below ground surface. This area may also have received fill. This trench will help characterize the soil profile at least through the upper few feet that may have been disturbed by scrap metal handling. Nine (9) soil samples will be obtained for analysis from the trench: three near the surface, three at the bottom of the trench, and three at the highest PID reading or soil staining between the other sample levels. If no PID reading or soil staining is evident, then the final three samples will be taken at a randomly selected elevation between the top and bottom samples in that area of the trench.

In addition, thirty surface samples will be collected from surface soils and soil-like materials within the former foundry building. Eight of these thirty samples will be collected from the soil-like material at a depth of 0 to 6 inches if possible within the former foundry in order to detect if contamination of the interior of the building is present. The remaining 22 samples will be collected at 12 locations in the surface soils outside of the two buildings on the site. At least two of these samples will be collected at a depth of 0 to 6 inches in the vicinity of the former aboveground vehicle fuel tank. At least four samples will be collected at two locations adjacent to the railroad at depths of 0 to 6 inches and 12 to 18 inches. The final 16 samples will be collected at locations in the soils outside these described areas at depths of 0 to 6 inches and 12 to 18 inches. Within these designated areas the sample locations will be randomly located.

All of the samples will be tested with a field PID unit and will be sent to a fixed analytical laboratory for the following parameter categories:

- Semi-volatile compounds (SVOCs)
- Priority pollutant metals
- PCBs

D.3.2 <u>AOC at County IDA Property</u>

The identified possible sources of contamination include:

- Slag from steel manufacture, and
- Coal tar from coal gasification.

Both sources appear to have been placed over time, therefore investigation into the soils at depth appears to be necessary.

The site will be investigated by a trackhoe digging trenches. Trenches have the advantage of revealing a great deal of information about subsurface conditions. Three trenches will be dug parallel to the Hudson

River across the property. One trench will be near the western edge of the subject AOC, one trench will be near the center of the subject AOC, and one trench will be near the eastern edge of the subject AOC.

A total of thirty six (36) samples will be collected from the trenches. The sample locations will be at suspect subsurface discontinuities that are discovered or at randomly selected locations within the trenches. The trenches will be terminated at 5 feet of natural soils beneath slag, at the encounter of groundwater, or 18 feet in total depth, whichever is achieved first. A field PID unit will be used to screen the samples from the trenches. All of the samples will be sent to a fixed analytical laboratory for the following parameter categories:

- Semi-volatile compounds (SVOCs)
- Priority pollutant metals

After the results are received and interpreted, if contamination by coal tar is above levels prescribed in NYSDEC TAGM 4046, the County IDA will be contacted regarding their responsibility to delineate the extent of contamination and to perform remedial actions to address the contamination.

D.3.3 The King Fuels North/"The Alamo" Property (Site #43) AOC

The identified possible sources of contamination include:

- Petroleum contamination in soils from petroleum spills associated with the fuel oil tank,
- Slag from steel manufacture, and
- Coal tar from coal gasification.

Twelve (12) samples will be taken at 4 test pit locations. The first test pit location will be located on the east side of the circular slab on which the former petroleum tank used to rest. The second and third test pit locations will be on the southwest and northwest sides of the circular slab. The fourth test pit location will be just west of the southwest corner of the 10-foot concrete wall, which is the location that was identified as the Oil Pump HO (House). The test pits will be terminated at refusal, at the encounter of groundwater, or 18 feet in total depth, whichever is achieved first. Each test pit location will have three samples. At least one sample from each test pit location will be collected at the location of the highest reading on a field PID in the test pit. Otherwise, one sample will be taken at the top of each test pit location, one sample at the bottom of each test pit location and one sample between the top and bottom sample. This middle sample will be taken at the most marked transition found within each test pit location, if present, at the highest PID reading if such occurs or at a randomly selected elevation between the top and bottom samples.

In addition to the test pits, three surface soil locations will be sampled. One sample will be taken at the 0 to 6 inch depth, and one sample will be taken at the 12 inch to 18 inch depth. These locations will be selected at any suspicious locations as determined either by visual means alone or PID readings. If no suspicious locations are found, locations will be randomly selected.

All of the samples will be sent to a fixed analytical laboratory for the following parameter categories:

- Semi-volatile organic compounds (SVOCs)
- Priority pollutant metals

After the results are received and interpreted, if contamination for petroleum constituents are above the NYSDEC petroleum spills guidance objectives (utilizing TAGM 4046), then the owner of record will be informed of the results and their potential responsibility to delineate the extent of contamination and to perform remedial actions to address the contamination.

D.3.4 Background Samples

Two soil samples whose location is designed to be representative of background soil concentrations in the regional area will be collected. One sample will be collected in the drainage area of the Poesten Kill and the other will be obtained in the drainage area of the Wynants Kill. The locations will be selected at areas where the soil appears to be minimally affected by human activity and close enough to the respective streams that the soil appears destined to eventually erode into the stream.

These soil samples will be sent to a fixed analytical laboratory for the following parameter categories:

- Priority pollutant metals

The results of this analysis will be utilized as a basis for comparison to the results from analytical testing of the three AOC sites in this study.

D.4 Project Time Line

Activities *(Includes Products and/or Services)*	Dates *(MM/DD/YY)*	
	Activity Start Date	Activity End Date
Preparation of SAMP	05/01/03	08/08/03
Client Review of SAMP	08/08/03	08/15/03
USEPA Review of SAMP	09/15/03	10/15/03
Revisions of SAMP	10/15/03	10/22/03
Conduct Soil Sampling Activities	10/30/03	11/15/03
Analytical Testing and Lab Report	11/15/03	12/07/03
Prepare Site Investigation Report	12/07/03	12/21/03
Client Review of Report	12/21/03	12/28/03
Revisions to Site Investigation Report	12/28/03	01/05/04
Submittal of Report to USEPA	01/05/04	

E.0 Sampling and Analysis

The purpose of performing a Brownfields site investigation is to determine the presence and identity of contaminants, as well as, the extent to which they have become integrated into the surrounding environment. The objective of this effort will be to collect and analyze environmental samples which are representative of the media under investigation. The methods and equipment used for collecting environmental matrices of concern will vary with the associated physical and chemical properties of each media designated for sampling.

To ensure sampling and analytical protocols are appropriate, it is necessary to describe the objectives and details comprising these activities. As a result, the design of a proper sampling scheme, including protocols for collecting rinse blanks, trip blanks, duplicates, and background samples should be derived from an accepted guidance. As such, the U.S.EPA Superfund Program Representative Sampling Guidances, Volume 1: Soil 6; Volume 5: Water and Sediment, Part 1 - Surface Water and Sediment 7; Volume 5: Water and Sediment, Part II - Ground Water 8 are included as attachments to the Generic Brownfields QAPP boilerplate. These media specific guides are the U.S.EPA's formal sampling Guidances which outline protocols for the collection of representative samples to ensure the accurate characterization of site conditions. Therefore, following these guides will assist in the design of a fitting sampling network which is thoroughly justified and documented in the corresponding Site-Specific Brownfields SAMP.

E.1 Sampling Design

STERLING has designed surface and subsurface soil sampling site investigations to determine the impacts to soil of potential releases from the known historical uses at three AOCs. The SAMP includes 66 surface soil samples and 32 soil samples at depth. The locations of surface soil sampling points and soil direct push or boring locations are depicted in the location maps and the rationale for the location and sampling parameters for each follows.

The sampling design is a judgment-based sampling strategy that relies upon the information available from the July 26, 2000 Environmental Planning and Research Report prepared by STERLING, subsequent site visits, and interviews conducted with owners. Surface soil samples, soil samples from excavations, and soil samples from borings will be collected from the sites to characterize the type and extent of contaminants that may be present. The parameters that will be analyzed include volatile organic compounds, Semi-VOCs, Priority Pollutant metals, and PCBs. The analytical results from soil samples will be compared to NYSDEC TAGM 4046 Soil Cleanup Objectives. These action levels are designed to be conservatively protective of groundwater as well as mitigate risk from direct soil ingestion, and will be considered when making recommendations regarding future site redevelopment. The following table presents the rationale for siting each of the surface soil sampling locations and soil borings.

Sample #	Location	Location of Concern	Potential Contaminants
S-B1-T	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B1-M	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B1-B	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B2-T	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B2-M	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B2-B	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B3-T	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B3-M	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B3-B	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B4-T	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B4-M	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-B4-B	Figure 1B	Bulkhead fill	SVOCs, PP Metals, PCBs
S-T1-T	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T1-M	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T1-B	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T2-T	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T2-M	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T2-B	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T3-T	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T3-M	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-T3-B	Figure 1B	Scrapyard, Bulkhead fill	SVOCs, PP Metals, PCBs
S-S-F-1	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-F-2	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-F-3	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-F-4	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-F-5	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-F-6	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-F-7	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-F-8	Figure 1B	Foundry building	SVOCs, PP Metals, PCBs
S-S-T-1	Figure 1B	Fuel Tank	SVOCs, PP Metals, PCBs
S-S-T-2	Figure 1B	Fuel Tank	SVOCs, PP Metals, PCBs
S-S-R1-0-6	Figure 1B	Adjacent to Railroad	SVOCs, PP Metals, PCBs
S-S-R1-12-18	Figure 1B	Adjacent to Railroad	SVOCs, PP Metals, PCBs
S-S-R2-0-6	Figure 1B	Adjacent to Railroad	SVOCs, PP Metals, PCBs

S-S-R2-12-18	Figure 1B	Adjacent to Railroad	SVOCs, PP Metals, PCBs
S-S-Y1-06	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y1-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y2-0-6	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y2-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y3-0-6	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y3-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y4-0-6	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y4-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y5-0-6	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y5-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y6-0-6	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y6-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y7-0-6	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y7-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y8-0-6	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
S-S-Y8-12-18	Figure 1B	Adjacent to Scrap Yard and Foundry	SVOCs, PP Metals, PCBs
I-T-1-1	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-2	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-3	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-4	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-5	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-6	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-7	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals

I-T-1-8	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-9	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-10	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-11	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-1-12	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-1	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-2	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-3	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-4	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-5	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-6	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-7	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-8	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-9	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-10	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-11	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-2-12	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-1	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-2	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-3	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-4	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-5	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-6	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-7	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals

I-T-3-8	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-9	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-10	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-11	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
I-T-3-12	Figure 1C	Steel Manufacture, Coal Tar Disposal	SVOCs, PP Metals
A-T-1-T	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-1-M	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-1-B	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-2-T	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-2-M	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-2-B	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-3-T	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-3-M	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-3-B	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-4-T	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-T-4-M	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-S-1-0-6	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-S-1-12-18	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-S-2-0-6	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-S-2-12-18	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-S-3-0-6	Figure 1D	Petroleum Spill	SVOCs, PP Metals
A-S-3-12-18	Figure 1D	Petroleum Spill	SVOCs, PP Metals
B-S-1	*	None (background)	PP Metals
B-S-2	**	None (background)	PP Metals

* To be determined within Poesten Kill drainage basin.
** To be determined within Wynants Kill drainage basin.

F-1.0 Standard Operating Procedures

Often many routine laboratory and field operations are cataloged to form Standard Operating Procedures (SOPs). Whenever SOPs are applicable and available, they should always be incorporated into the overall data collection activities inherent to performing a Brownfields site investigation. Site-Specific Brownfields SAMPs should delineate all activities which could directly or indirectly influence data quality. This should include a determination of all operations which can be covered by SOPs. Therefore, all Site-Specific Brownfields SAMPs should contain, at a minimum, SOPs for the following operations:

- Sampling and analytical methodologies.
- Field equipment selection and use.
- Field equipment calibration and standardization.
- Field equipment preventive maintenance.
- QC procedures for intra-laboratory and intra-field activities.
- Data validation.
- Document control procedures.

F-1.1 Sampling SOPs

To ensure environmental sample collection efforts are representative of site conditions, it is customary to utilize accepted SOPs to optimize sampling activities. Sampling SOPs are typically proven protocols which may be varied or changed, as required, depending upon site conditions and/or equipment limitations imposed by the procedure. In all instances, those sampling procedures which will be employed to collect environmental samples for a given site investigation must be documented in the Site-Specific Brownfields SAMP.

To facilitate the selection of appropriate sample collection techniques, it is advantageous that the sampling SOPs employed for a site-specific Brownfields investigation be derived from an accepted guide. As such, the ***U.S.EPA Compendia of Emergency Response Team (ERT) Sampling Procedures*** including ***Soil Sampling and Surface Geophysics Procedures*** 9, ***Surface Water and Sediment Sampling Procedures*** 10, and ***Groundwater Sampling Procedures*** 11 are included as attachments to the Generic Brownfields QAPP boilerplate. These media specific sampling protocols are the U.S.EPA's accepted SOPs for collecting potentially contaminated environmental matrices of concern such as soil and water. Therefore, to optimize sample collection efforts, these protocols are to be used in conjunction with the ***Superfund Program Representative Sampling Guidances***.

F-1.2 SOP Reference Table

ANALYTICAL METHOD REFERENCE (*Include document title, method name/number, revision number, date)*
1a. CLP Volatile Organic Compound Analysis – (see Attachment A)
2a. CLP Semivolatile Organic Compound Analysis –(see Attachment A)
3a. CLP Semivolatile Organic Compound Analysis – (see Attachment A)
4a. CLP Priority Pollutant Compound Analysis – (see Attachment A)
PROJECT ANALYTICAL SOPs (*Include document title, date, revision number, and originator's name)*
1b. Photovac Model 2020 Instrument Manual, dated 2000, prepared by PerkinElmer, Inc. (manufacturer) (see Attachment B)
2b. Quality Assurance Manual for Selected Laboratory (to be submitted when Laboratory is selected)
3b. Field Screening with a Photoionization Detector, SOP #6, dated September 2003, prepared by Sterling Env'l Eng., P.C. (see Attachment C)
PROJECT SAMPLING SOPs [1] (*Include document title, date, revision number, and originator's name)*
1c. U.S.E.P.A. Compendia of Emergency Response Team (ERT) Sampling Procedures including Soil Sampling and Surface Geophysics Procedures, Surface Water and Sediment Sampling Procedures, and Groundwater Sampling Procedures. This SOP is part of the Generic Brownfield QAPP.
2c. Sampling and Guidelines and Protocols dated March 1991, prepared by the New York State Department of Environmental Conservation.
3c. Soil sampling, SOP #2, dated September 2003, prepared by Sterling Env'l Eng., P.C., revision 0 (see Attachment D)
4c. Sampling Equipment Decontamination, SOP #3, dated June 2003, prepared by Sterling Env'l Eng., P.C., revision 0 (see Attachment E)
5c. Containment and Disposal, SOP #7, dated September 2003, prepared by Sterling Env'l Eng., P.C., revision 0 (see Attachment F)
6c. Sample Preservation and Containers, SOP #4, dated September 2003, prepared by Sterling Env'l Eng., P.C., revision 0 (see Attachment G)
7c. Sample Quality Control, SOP #8, dated September 2003, prepared by Sterling Env'l Eng., P.C., revision 0 (see Attachment H)
8c. Samplers Guide to Contract Laboratory Program 9240-30, prepared by USEPA. Part of the Generic Brownfield QAPP
[1] Project Sampling SOPs include sample collection, sample preservation, equipment decontamination, preventive maintenance, etc...

F-2.0 Sampling and Analytical Parameters

In this section of the Site-Specific Brownfields SAMP, detail the data collection and analysis design for the project. Tabulate by matrix/parameter(s) the analytical method(s) for analyzing each matrix of concern, and the anticipated detection limit(s) of the selected laboratory protocols. Insert the appropriate SOP number/letter reference in the table. Form F-1 contains the Method and SOP Reference Table. Attach analytical SOPs for sample collection and analysis for each parameter/matrix.

Matrix (Sample Type)[1]	Number of Samples[2]	Sampling SOP[3]	Parameter/Fraction	Minimum Sample Volume[4]	Sample Container[5]	Sample Preservation	Analytical Method[6]	CLP Contractual Reporting Limit	Technical Holding Time
Soil		See Section F-1.2	Target Compound List (TCL):						
	0	2c, 3c	Volatile Organics (VOCs)	4 oz.	2 oz. clear wide-mouth glass with Teflon lined septum.	Cool to 4°C	OLM0 4.2	10 µg/kg	14 days
	103	2c, 3c	Acid Extractable Organics Base & Neutral Organics (BNAs)	4 oz.	4 oz. amber wide-mouth glass with Teflon lined cap.	Cool to 4°C	OLM0 4.2	Compound Specific (330-830 µg/kg)	7 days extract; 40 days analyze
	50	2c, 3c	Pesticides/Aroclors (PCBs)	4 oz.	4 oz. amber wide-mouth glass with Teflon lined cap.	Cool to 4°C	OLM0 4.2	Compound Specific (1.7-170 µg/kg)	7 days extract; 40 days analyze
			Priority Pollutant Metals:						
	105	2c, 3c	Total Metals	6 oz.	8 oz. clear wide-mouth glass with Teflon lined cap.	Cool to 4°C	ILM0 4.0	Analyte Specific (0.2-5000 µg/L)	180 days; (28 days Hg)

Legend:
1 Sample Type: insert sample location, identification number, and sample depth when necessary.
2 The number of samples includes one field duplicate sample.
3 The reference number corresponds to the Project Sampling SOP delineated in Form F-1.
4 Triple volume is required for matrix spike/matrix spike duplicate analysis.
5 All sample bottles must comply with the *U.S.EPA Specifications and Guidance for Contaminant-Free Sample Containers,* OSWER Directive #9240.0-05A, EPA 540/R-93/051.
6 The complete analytical method citation is delineated in Form F-1.

G.0 Preventive Maintenance - Field Equipment

The purpose of this section is to delineate the SOPs/methods which will be utilized to ensure that all field equipment will function in an optimum manner. This summary should reference all pertinent SOPs/methods for performing these activities. It should also include a brief description of each specified procedure along with the frequency of application for employing these methods.

It is important to note that all field equipment should be maintained in accordance with each respective instrument manufacturer's operating instructions with all maintenance activities recorded in a log book. Each equipment log book should remain with instrument except when it is sent out for repairs. This equipment log book is useful in tracking records of usage, maintenance, and repairs.

The field equipment and/or systems requiring periodic preventive maintenance are identified in the following table. All references are included on how periodic preventive and corrective maintenance of field measurement or test equipment will be performed to ensure availability and satisfactory performance. These references include descriptions of how to resolve field instrument deficiencies and when reinspections will be performed. In addition, these references describe the availability of spare parts identified in the manufacturer's operating instructions and how SOPs will be maintained.

Instrument	Activity	Frequency	SOP Reference
Portable Photoionization Detector (PID)	Soil Screening	Daily	1b and 3b

H.0 Calibration and Corrective Action - Field Equipment

The purpose of this section is to delineate the SOPs/methods which will be used to ensure that all field equipment calibration and corrective actions will be performed in a proper manner. This summary should reference all pertinent SOPs/methods for performing these activities. It should also include a brief description of each specified procedure along with the frequency of application for employing these methods. In conjunction, it is essential that these activities should always be recorded in a log book.

Performing instrument calibration is a necessary function which ensures the accuracy and precision of field testing equipment. Subsequently, the following procedures should always be implemented when calibrating field instrumentation:

- Reference the applicable SOP or provide a written description of the calibration procedure(s) used for each field measurement system.
- List the frequency planned for re-calibration and/or the criteria, including acceptance limits, utilized to dictate the frequency of re-calibration.
- List the calibration standards to be used and their source(s), including traceability procedures.

Corrective actions are the processes for rectifying a field measurement system which is not operating within specified control limits. These techniques which facilitate the collection of representative field measurement data should always include the following information:

- The pre-determined limits for data acceptability beyond which corrective action is required.
- Procedures for corrective actions.
- Identify the individuals responsible for initiating and approving the implementation of corrective actions for each measurement system.

Therefore, the table below identifies all tools, gauges, and equipment for field screening data collection efforts which require calibration to operate within specified limits. References are provided for all calibration procedures using certified equipment and standards with recognized performance criteria. In addition, the procedures are specified for maintaining calibration and corrective action records.

Instrument	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Reference
Photoionization Detector (PID)	Calibrate with standard gas	Daily	Reading equal to standard concentration	Adjust span knob until reading equals standard	1b, 3b
PID continued	Zero meter	Daily	Reading equal to zero after checking standard gas	Adjust zero control knob until reading is zero	1b, 3b

I.0 Preventive Maintenance - Laboratory Equipment

The purpose of this section is to delineate the SOPs/methods used to ensure the optimum performance of laboratory equipment. It is essential that the frequency and application of these methods be appropriately recorded in a log book. In conjunction, it is advantageous to provide a schedule of all the routine preventive maintenance tasks which will be performed to minimize laboratory instrument downtime. It is customary that these SOPs/methods note and address all critical spare parts that should be on hand to minimize instrument downtime.

All laboratory equipment should be maintained in accordance with each respective instrument manufacturer's operating instructions with all maintenance activities recorded in a log book. Each equipment log book should remain with instrument except when it is sent out for repairs. This equipment log book is useful in tracking records of usage, maintenance, and repairs.

The selected analytical laboratory will provide the soil analytical support for this SAMP. Consequently, the selected analytical laboratory will be responsible for performing preventive maintenance on the laboratory equipment. The selected analytical laboratory will include the proper certifications in the appropriate categories of the ASP/CLP under the Contract Laboratory Protocol (CLP) section. The selected analytical laboratory will be required to submit and follow their approved Quality Assurance Manual, including preventive maintenance.

Instrument	Activity	Frequency	SOP Reference[1]
To be provided by selected analytical laboratory.			

[1] Insert the appropriate reference number/letter from Form F-1, Method and SOP Reference Table.

J.0 Calibration and Corrective Action - Laboratory Equipment

The purpose of this section is to delineate the analytical techniques which will ensure the laboratory instrumentation employed will accurately and precisely quantitate the target analytes of concern.

The selected analytical laboratory will provide this information for all the target compound list of parameters such that the data objectives of this SAMP are supported. The protocol will follow the *USEPA – Contract Laboratory Protocol OLMO 4.1* for inorganic analytes and the *USEPA – Contract Laboratory Protocol OLMO 4.2* for the organic analytes. Additionally, the selected analytical laboratory will be required to submit and follow their approved Quality Assurance Manual, including calibration and corrective action procedures for the laboratory equipment.

K.0 Sample Documentation and Handling

An essential element of any Brownfields sampling/analytical scheme is to maintain sample integrity from collection to data reporting. This involves tracing the possession and handling of samples from the time of collection through analysis and final disposition. The documentation used to track a sample's history is referred to as the "chain-of-custody." To facilitate sample chain-of-custody efforts, all inspections, investigations, and photographs which are taken will be recorded and a thorough review of all notes will be performed before leaving the site.

To promote the management of sample integrity, all parties involved will be informed that a sample is considered to be under a person's custody if; (a) it is in a person's physical possession, (b) it is in view of that person after he/she has taken possession, (c) secured by that person so that no one can tamper with the sample, or (d) secured by that person in an area which is restricted to authorized personnel. A person who has samples under their custody must always comply with these procedures in order to ensure sample integrity.

K.1 Sample Documentation

All sample documents must always be legibly written in ink. Any corrections or revisions to sample documentation will be made by lining through the original entry and initialing any changes. To elaborate on these requirements, the following sub-sections are provided to outline sample documentation procedures which must be employed when conducting a Brownfields investigation.

K.1.1 Field Logbook

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate and factual account of field procedures may be reconstructed. All entries must be signed by the individuals who are making them. Nonetheless, all field logbook entries must always document the following specific information:

- Site name and project number.
- Contractor name and address.
- Names of personnel on site.
- Dates and times of all entries.
- Descriptions of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.
- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and chain of custody information.
- Records of photographs.
- Site sketches.
- All relevant and appropriate information delineated in field data sheets and sample labels.

K.1.2 Field Data Sheets and Sample Labels

Field data sheets, along with corresponding sample labels, are routinely used to identify samples and document field sampling conditions and activities. Field data sheets must be completed at the time of sample collection and must always include the following information:

- Site name.
- Contractor name and address.
- Sampler's name.
- Sample location and sample identification number.
- Date and time the sample was collected.
- Type of sample collected.
- Brief description of the site.
- Weather conditions.
- Analyses to be performed.
- Sample container, preservation, and storage information.

Sample labels are always to be securely affixed to the sample container. They must always clearly identify the particular sample, and delineate the following information:

- Site name and designated project number.
- Sample identification number.
- Date and time the sample was collected.
- Sample preservation method.
- Sample pH (water samples only).
- Analysis requested.
- Sampling location.

K.1.3 Chain of Custody Record

A chain-of-custody record must always be maintained from the time of sample collection until final deposition. Every transfer of custody will be noted and signed for with a copy of the record being kept for each individual which endorsed it. It is integral that the chain-of-custody record must always include the following information:

- Contractor name and address.
- Sample identification number.
- Sample location.
- Sample collection date and time.
- Sample information (matrix type, number of bottles collected, container type, etc.).
- Names and signatures of samplers.
- Signatures of all individuals who have had custody of the samples.

K.1.4 Custody Seals

Custody seals are used to demonstrate that a sample container has not been opened or tampered with. The individual who has sample custody must always sign, date, and affix the custody seal to the sample container in such a manner that it cannot be opened unless it is broken. When samples are not under direct control of the individual currently responsible for them, they will be stored in a locked container which is also to be affixed with a custody seal.

K.2 Sample Handling and Shipment

It is customary for field sampling personnel to always transport environmental samples directly to the laboratory within 24 hours of sample collection. To assist in these efforts, field sampling personnel will either utilize an overnight delivery service within 24 hours of sample collection or will transport them to the laboratory directly.

When preparing sample containers for shipment they must always be securely closed with a custody seal affixed to each cap. All sample containers will be labeled as described above. Subsequently, they are to be placed in an appropriate transport container and packed with an absorbent material such as vermiculite. All sample containers will be packed with ice to maintain a temperature of 4°C. All sample documentation will then be affixed to the underside of each transport container lid. The transport container lid will then be closed and affixed with a custody seal accordingly.

Regulations for packaging, marking/labeling, and shipping hazardous materials and wastes are issued by the U.S. Department of Transportation (U.S. DOT). Air carriers which transport hazardous materials, such as Federal Express, may also require compliance with the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations. The IATA protocol details the procedures for the shipment and transportation of hazardous materials by a common air carrier. All current IATA regulations will be followed to ensure compliance with U.S. DOT protocol.

K.3 Sample Handling and Chain of Custody Requirements

All samples collected as part of this SAMP will be collected in the appropriate laboratory supplied containers. The containers will comply with the USEPA Specification and Guidance for Contaminant-Free Sample Containers, OSWER Directive #92405.05A, EPA 540/R-93/051. The sample containers will be appropriately labeled, identified on the Chain of Custody and placed in a cooler with ice packs. Subsequently, at the end of the field work for that day, the samples will be shipped via overnight mail or delivered directly to the selected analytical laboratory accompanied by the completed Chain-of-Custody. Examples of Chain of Custody forms, labels, and custody seals will be provided by the selected laboratory after their selection.

All samples will be assigned unique sample numbers. Samples will be numbered in the following manner:

- Site Identification (S = Scolite, I = IDA)
- Boring Number: 1,2,3,…
- Sample Interval: e.g. 0-0.5’

Soil samples to be field screened will be obtained according to the appropriate SOP, such as:

- Subsurface Sampling With A Split Spoon (3c.)
- Soil Sampling With A Hand Augur (2c).

All samples will be placed in a resealable plastic bag. All samples will be labeled with the sampling date, the sample location and sample interval, and the collection method. All information regarding samples will be logged in the field notes. At each sampling location, the bags will be temporarily stored in a specified area for field screening. The bags from a boring will be field screened with the PID after all samples have been collected from that boring. The PID readings will be accomplished according to SOPs 1b and 3b. Once all the field readings have been taken, the unused soil samples will be emptied into the boring hole. All empty sampling bags will be disposed of as non-hazardous waste.

A sufficient amount of soil will be collected for each of the analytical parameters to be determined twice by the specified analytical methods according to the specified protocol. This will ensure that a re-analysis can be performed if necessary. Samples destined for organic compound analysis will be placed in glass jars to prevent the plasticizers and other organic compounds found in plastics from contaminating the samples.

Appropriate preservation by cold temperature storage at 4°C will be utilized to ensure that the analytical parameters are not affected by the time the sample reaches the analytical laboratory. Samples will be analyzed prior to the applicable holding time for each analytical parameter.

All sample handling in the field and transportation will conform to the sample custody procedures. Field custody procedures include proper sample labeling, chain-of-custody forms, and packaging and shipping procedures. Sample labels will be attached to all sampling bottles before each sampling day's effort to ensure that proper sample identification is maintained. As noted earlier, each label will identify the sampling site and sample location.

Each sample cooler will be lined with two plastic bags of 6 mil thickness. Styrofoam, bubble wrap or empty plastic bottles will be used to fill up empty space in each cooler and prevent breakage of containers during handling and transport. Ice packs, ice in bottles, or ice will be placed in between the plastic lining bags to accomplish sample preservation.

After each sample is packaged and labeled, the following information will be recorded on the chain-of-custody form:

1. site name and address
2. sampler(s)' name(s) and signature(s)
3. names and signatures of the persons involved in the chain of possession of the samples
4. sample number
5. number of containers
6. sample location
7. date and time of collection
8. type of sample, sample matrix (soil) and analysis requested
9. any pertinent field data collected (PID reading)

The sampler will:

- sign and date the "Relinquished" space,
- remove one copy of the chain-of-custody form,
- seal the remaining copies of the form in a resealable plastic bag, and,
- tape the bag containing the chain-of-custody form to the underside of the sample cooler lid.

When the sample cooler is filled with sample containers and the chain-of-custody form has been filled out fully and affixed to the underside of the lid, the 6 mil plastic bags will be sealed around the samples by twisting the top and securely taping each bag closed to prevent leakage. A sample custody seal will be placed around the outer bag which will include the signature of the project manager or his/her designee, and the date and time.

The sample cooler itself will be sealed with tape prior to shipment to the laboratory. Custody seals will be placed spanning the cooler lid and cooler base in such a manner to make unauthorized tampering visible during transport, but especially at the laboratory. These seals will include the signature of the project manager or his designee and the date and time.

Further details for the above procedures are given in SOPs 6c,7c, and 8c (see SOP Reference Table F-1.2).

L.0 Analytical Data Quality Requirements and Assessments

An important aspect in the Brownfields project planning process is to define what levels of data are required. These data quality requirements are to be based on a common understanding of its intended use, the complexity of the measurement process, and the availability of resources. Once data quality requirements are clearly determined, QC protocols are to be defined for measuring whether these environmental monitoring acceptance/performance criteria are being met.

L.1 Data Acceptance/Performance Criteria

When conducting a Brownfields site investigation, it is essential to collect data which are of sufficient quantity and quality to support accurate decision making. The most effective way to accomplish these objectives is to determine the type, quantity, and quality of environmental measurement data which are necessary to achieve monitoring goals prior to the commencement of sampling. To ensure the level of detail is commensurate with the objectives of a Brownfields site investigation, a common sense "systematic planning" approach should be followed. This process is useful in promoting the development of "acceptance and/or performance criteria" for gauging the collection, evaluation, and use of environmental measurement data.

Data "acceptance and/or performance criteria" are prerequisites established to specify the quality of Brownfields site investigation environmental monitoring results required to support decisions. Data acceptance/performance criteria are predicated in accordance with the anticipated end uses of the information which are to be collected. The establishment of data acceptance/performance criteria are applicable to all phases and aspects of the remediation process including site investigation, design, construction, and clean up operations. It is important to note that the level of detail and quality needed will often vary with the intended use of the data. Consequently, in most instances QA/QC activities involving precision and accuracy determinations are relied upon to assess acceptance/performance criteria.

L.2 Analytical Precision

Analytical precision measurements are typically determined when performing instrumental analyses to assess the errors associated with analyte interferences, sample heterogeneity, and poor laboratory practices. They are commonly undertaken by incorporating matrix spike, matrix spike duplicate, and/or matrix duplicate quality control sample analyses into the analytical scheme. Precision measures are often best expressed by calculating the Relative Percent Difference (RPD) between a sample and its duplicate determination. The Relative Percent Difference (RPD) between the two results will be calculated as follows and used as an indication of the precision of the analyses performed:

$$RPD = \frac{|S - D| \times 100}{(S+D)/2}$$

S = Sample
D = Duplicate
| | = Indicates absolute value of the difference to express RPD as a positive value.

L.3 Analytical Accuracy

Analytical accuracy determinations are typically undertaken when performing instrumental analyses to assess the proficiency of the measurement process. They are commonly undertaken by incorporating calibration verification, method blank, calibration blank, method control, surrogate spike, and/or matrix spike quality control sample analyses into the analytical scheme. Accuracy measures are often best expressed by calculating the Percent Recovery (%R) between true and found values as follows:

% R = A/B x 100 A = The found analyte concentration determined experimentally.
B = The true analyte concentration.

L.4 Analytical Precision and Accuracy Requirements

This section delineates the analytical techniques for ensuring the laboratory equipment employed will accurately and precisely quantitate each target analyte of concern. Therefore, the selected analytical laboratory will provide this information for all the target compound list of parameters such that the data objectives of this SAMP are supported. The protocol will follow the *USEPA – Contract Laboratory Protocol OLMO 4.1* for inorganic analytes and the *USEPA – Contract Laboratory Protocol OLMO 4.2* for organic analytes. Also, the selected analytical laboratory will be required to submit and follow their approved Quality Assurance Manual and laboratory SOPs for all analytical procedures employed by the laboratory, especially with regards to obtaining the proper analytical precision and accuracy. These documents will identify the analytical methods and equipment required, including sub-sampling or extraction methods, laboratory decontamination procedures and materials, waste disposal requirements (if any), and specific performance requirements (quantitation levels, precision limits, accuracy limits, etc.) for each method. These requirements are summarized in the following sub-sections of this SAMP for all fixed laboratory confirmatory and in-situ field screening analyses which will be undertaken in this site-specific Brownfields investigation.

L.4.1 Fixed Laboratory Precision and Accuracy Requirements

The analytical precision and accuracy protocols will be conducted in accordance with the appropriate USEPA CLP SOW. The **USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration OLM0 4.2** or latest revision will be used for TCL determinations. The **USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration ILM0 4.0** or latest revision will be used for TAL determinations. Also, the SOPs of the selected analytical laboratory will specify the precision and accuracy protocols that will be followed within the use of the USEPA documents mentioned above.

L.4.2 In-situ Field Analytical Precision and Accuracy Requirements

The precision and accuracy of the portable PID will be ensured in conformance with SOPs 1b and 3b (see reference Table F.1.2).

These SOPs include the following QA/QC protocols:

- Sample documentation (recording sample collection location, time and date, and associated field measurements, etc.).
- Field analytical screening documentation (providing raw data, calculations, and final results for the field screening analysis of all environmental and accompanying QC samples).
- Method calibration (requiring the initial and continuing calibration of all field analytical instrumentation according to the instrument manufacturer's operating instructions).

Please refer to these SOPs for further detail.

M.0 Data Measurement Quality Objectives

When conducting a Brownfields site investigation, all measurements should be made so that results are reflective of the environmental media and conditions being measured. To assess if environmental monitoring measurements are of an appropriate quality, "acceptance and/or performance criteria" are typically established. Acceptance/performance criteria are commonly assessed by evaluating the Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC) of pertinent
QA/QC options specified for sampling and analytical activities.

- Precision; a measure of the reproducibility of analyses under a given set or conditions.
- Accuracy; a measure of the bias that exists in a measurement system.
- Representativeness; the degree sampling data accurately and precisely depict selected characteristics.
- Completeness; the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under "normal" conditions.
- Comparability; the degree of confidence with which one data set can be compared to another.

M.1 Sample Collection Precision

Sample collection precision is customarily assessed by collecting field duplicate samples. Field duplicate samples are used to evaluate errors associated with sample heterogeneity, sampling methodology and analytical procedures. The analytical results from these samples are important because they provide data to evaluate overall measurement precision. One field duplicate will be collected for every 20 samples collected (soil is the only matrix) and will be analyzed for each of the analytical methods performed for the group of 20.

M.2 Sample Collection Accuracy

To assess sample accuracy, field QC samples such as rinsate, trip, and/or field blanks, are typically incorporated into the sampling scheme. The data acquired from the analysis of blanks are useful in their ability to evaluate errors which can arise from cross-contamination. The occurrence of cross-contamination can result from the improper handling of samples by field and/or lab personnel, improper decontamination procedures, improper shipment and storage, and on-site atmospheric contaminants. Therefore, to facilitate sample collection accuracy, it is essential to maintain the frequent and thorough review of field procedures so that deficiencies can be quickly documented and corrected. One field blank will be collected at the end of each day of boring or surface sampling. The field blank will be analyzed for as many of the following that apply to that day's sampling: CLP SVOCs, CLP PCBs, and CLP Priority Pollutant metals**.**

M.3 Sample Collection Representativeness

Representativeness is an expression of the degree to which a sample accurately and precisely represents a characteristic of a population, parameter variations at a sampling point or an environmental condition.
Representativeness is a qualitative parameter which relies upon the proper design of a fitting sampling program and proper laboratory protocol. This criterion is best satisfied by making certain that sampling locations are selected properly and a sufficient number of samples are collected. Therefore, sample representativeness will be assessed by collecting field duplicates. Traditionally, field duplicates are by

definition, equally representative of a given point in space and time.

M.4 Sample Collection Comparability

Comparability is defined as an expression of the confidence with which one data set can be compared to another. In most instances, the proficiency of field sampling efforts will be the determining factor which affects the overall comparability of environmental measurement data. To optimize the comparability of environmental measurement data, sample collection activities should always be performed using standardized procedures whenever possible. When performing this Brownfields site investigation, these efforts will be facilitated by adhering to the quality control criteria and technical guidelines put forth in this QAPP boilerplate.

M.5 Sample Collection Completeness

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. Data completeness is often expressed as the percentage of valid data obtained from a given measurement system. To consider data valid, it is customary to assess if a set of data satisfies all of the specified acceptance/performance criteria (accuracy measures, precision measures, etc.) to render a determination. This necessitates that the data acquired for all confirmatory analyses critical to a Brownfields site investigation sampling program be validated (100%). Therefore, by performing a full data validation effort to ensure completeness, the rationale for considering data points non-critical will not be required.

M.6 Sampling Quality Control Requirements

To facilitate the documentation of a program to monitor sample collection operations, the pertinent field sampling QC procedures are delineated in the following table:

QC Sample	Frequency	Acceptance Criteria	Corrective Action
Field Quality Control Requirements			
Field Duplicate	5% per parameter per matrix or one per event.	Relative Percent Difference (RPD) less than 50 %	Sampling techniques, sample media, and analytical procedures will be examined to identify the cause of the high RPD and evaluate the usability of the data.
Co-located Sample	10% per parameter per matrix [1] or one per event.	Relative Percent Difference (RPD) less than 30 %	Sampling techniques, sample media, and analytical procedures will be examined to identify the cause of the high RPD and evaluate the usability of the data.
Equipment Rinsate Blank	5% per parameter per matrix per equipment type per decontamination event	No target analytes above five times the detection limit (ten times for common laboratory contaminants)	Equipment decontamination procedures will be reviewed.

N.0 Data Reporting

It is essential to the success of any Brownfields site investigation that a data flow or reporting scheme be developed. For any such scheme to be effective, it must address the complete scope of measurement results generated from all facets of an environmental monitoring project including the collection of raw data through the storage of validated results. In addition, it must also completely cover the step-wise procedures for entering data onto various reporting forms, as well as, into computer systems. These procedures should always cover routine data transfer and entry validation checks to ensure these processes are complete. To assist in these efforts, whenever possible, pre-printed forms should always be utilized for transcribing data.

N.1 Data Formatting

When conducting a Brownfields site investigation there must always be adequate documentation available to enable the summation of all pertinent measurement data. This is necessary to assist in the interpretation of the data while ensuring that it is both scientifically valid and legally defensible. As a result, it is integral that all records be legible, complete, and properly organized. In some instances, it may be appropriate to utilize a document control system. Therefore, when planning a Brownfields site investigation project, one must consider the type of record to be maintained, and the process for how these records will be stored.

N.2 Field Data Reporting

All real-time measurements and observations must always be recorded in project log books, field data records, or in similar types of record keeping books. Field measurements may include pH, temperature, specific conductance, alkalinity, water flow, soil gas readings, and possibly Flame Ionization Detector (FID)/PID measurements. All measurement data collected by performing in-situ analyses must always be recorded directly and legibly in field logbooks, with all entries being signed and dated. If entries must be changed, it is essential that these changes be made in such a manner that none of the original entries become obscured. Likewise, the reason for making a change should be specified with the correction and explanation being signed and dated at the time the revision was made. Therefore, to ensure the effective management of this information, it is important that field data records be organized into standard formats whenever possible, and retained in permanent files.

N.3 Laboratory Data Reporting

Whenever laboratory data are acquired, an analytical report should always be prepared to summarize the results of each environmental sample analyzed in accordance with this generic QAPP boilerplate. An analytical report should always contain information regarding the analytical methods or procedures employed, sample results, QA/QC results, chain of custody documentation, laboratory correspondence, and all accompanying raw data. It is integral that all data necessary for calculating percent recoveries be presented along with the analytical results.

To facilitate data interpretation efforts, it is advantageous for analytical reports to have all environmental sample data cross-referenced with the appropriate QC audit results (field blank, equipment rinsate blank, field duplicate, matrix spike, and matrix spike duplicate, etc.). Analytical reports should always cross-reference all laboratory data identification numbers with the corresponding field sample codes noted on the chain-of-custody as well. In addition, all pertinent handling/processing dates (time of collection, laboratory receipt, extraction, and analysis) for each sample applicable to the project must be referenced along with the applicable sample holding time.

Another important aspect to consider when formatting requirements for assembling an analytical report are the units for reporting final laboratory results. In most instances, the appropriate units for the reporting of final laboratory results are often dictated by factors such as the environmental sample media, analytical methodology, program/regulatory requirements, project objectives, and performance criteria. Therefore, it is important to specify the appropriate deliverables needed to assemble a complete analytical package for documenting that the pertinent resulting data are of an appropriate quality.

N.4 Data Management and Documentation Requirements

STERLING will manage and document the field data. All field data will be entered into field notebooks dedicated to this project. Photocopies of separate data sheets, such as boring logs created by the driller, will be stapled into the field notebooks. Sample Chain-of-Custody copies, field notebooks and all analytical data and the QC data package reports received from the laboratory will be kept in the project files in STERLING's office.

The selected analytical laboratory will manage and document the laboratory data. This selected laboratory will have to provide the procedures that will be used to manage data in their Quality Assurance Manual, including the issues of:

- accuracy,
- precision,
- data quality assessment,
- information management,
- sample control and management,
- data generation,
- verification and approval reports,
- reduction and storage, and
- document control.

STERLING will require a final report that will include:

- the sampling results, and
- a QC data package.

The QC package will be required to describe any issues or concerns that arose in extracting and analyzing the samples, organic surrogate recoveries, method blank results, laboratory control samples, MS/MSD results for organic analyses, and laboratory duplicate/spike sample results for inorganic analyses.

STERLING will retain an independent data validator to conduct a data validation on the project data. Twenty percent of the laboratory samples analyzed will be subjected to full data validation. Data validation will adhere to the procedures given in the following documents:

- CLP Protocol SOP No. HW-6: CLP Organics Data Review
- Preliminary Review SOP No. HW-2: Evaluation of Metals Data for Contract Laboratory Protocol; and
- USEPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis.

N.4.1 Fixed Laboratory Data Deliverable Requirements

The laboratory deliverable package will adhere to the **U.S.EPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration OLM0 4.2** or latest revision for organics and **U.S.EPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration ILM0 4.0** or latest revision for metals.

The laboratory data will be reviewed by the methods found in:

- CLP Protocol SOP No. HW-6: CLP Organics Data Review
- Preliminary Review SOP No. HW-2: Evaluation of Metals Data for Contract Laboratory Protocol; and
- USEPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis.

N.4.2 In-situ Field Analytical Data Deliverable Requirements

The analytical data deliverables for the Photoionization Detector (PID) will be entered onto the field screening data sheets. These data sheets will require entries for:

- Date and time of instrument calibration
- Deviations from the acceptance criteria and the corrective actions taken and the outcome, and
- Sampling results for every sample collected during the field effort.

O.0 Quality Assurance Requirements

The data collection scheme put forward in this generic Brownfields QAPP boilerplate encourages the design of a monitoring network which blends in-situ field analytical screening techniques with confirmatory fixed laboratory analyses. It specifies that a minimum of 20% of all samples collected during a Brownfields site investigation undergo fixed laboratory U.S.EPA CLP TAL and TCL confirmatory analyses. In conjunction, it specifies that approximately 50% of all background or "presumed clean" reference samples should likewise undergo fixed laboratory U.S.EPA CLP TAL and TCL confirmatory analyses to limit false negative and sampling errors. Therefore, to ensure data are of an appropriate quality, the following protocols apply whenever duplicate samples are collected to confirm field screening and/or laboratory analyses with limited analytical deliverables:

- When applicable, rinse and trip blanks will be collected and analyzed with all environmental samples.
- When CLP methods are used to corroborate field sampling or laboratory data with limited analytical deliverables, additional method specific duplicate samples should not be analyzed.
- Protocols for these CLP confirmatory analytical methods, sample containers, data deliverables, preservatives, chain-of-custody forms, matrix spike sample volumes, and shipping requirements are derived from the U.S.EPA Sampler's Guide to the Contract Laboratory Program.

O.1 Definitive Data Requirements

When conducting a Brownfields site investigation, definitive data should always be acquired using rigorous analytical protocols, such as conventional U.S.EPA reference methods. This involves securing the acquisition of data which are media-specific to confirm target analyte identities and concentrations.

Conventional analytical methods are known to produce tangible raw data (chromatograms, spectra, digital values, etc.) in the form of paper printouts and/or computer-generated electronic files. In most instances, definitive data can be generated at the site with a field analytical screening technique or at an off-site fixed laboratory by employing the necessary QA/QC protocols. But regardless of what type of determination is utilized, for data to be definitive, an assessment of analytical or total measurement error must be determined. Therefore, the following criteria should always be implemented when performing a site-specific Brownfields investigation:

- Definitive data QA/QC elements.
- Sample documentation (location, date and time collected, batch, etc.).
- Chain of custody for samples analyzed by an off-site laboratory.
- Sampling design approach (systematic, simple or stratified random, judgmental, etc.).
- Initial and continuing calibration.
- Determination and documentation of instrument and method detection limits.
- Analyte(s) identification.
- Analyte(s) quantification.
- QC blanks (trip, method, rinsate).
- Matrix spike recoveries.

O.2 Analytical Error

Performing an estimate of analytical error is the process of determining a measure of overall precision for a particular analytical method. To render a determination of analytical error, an appropriate number of duplicate aliquots are taken from at least one thoroughly homogenized sample. These duplicate sample aliquots are then analyzed with standard laboratory QC parameters to calculate and compare method performance criteria (variance, mean, and coefficient of variation).

O.3 Total Measurement Error

The determination of total measurement error is an estimate of the overall precision of an environmental data acquisition system, from sample collection through analysis. To render a determination of total measurement error, an appropriate number of samples are independently collected from the same location. These collocated samples are then analyzed with standard laboratory QC parameters to calculate and assess measurement error goals (variance, mean, and coefficient of variation). Measurement error goals are acceptance/performance criteria typically established for the purpose of evaluating data quality. To ascertain a thorough assessment of total measurement error, this process should be undertaken for each environmental matrix under investigation and/or repeated for a given media at more than one location.

O.4 Assessment and Response Actions

The sampling personnel are the first to detect and correct problems that could or will affect field data quality. They can often detect instrument perturbations, or malfunctions and correct them. In the case of major malfunctions, they are usually the best to select and quickly implement corrective actions so that data corruption and loss is minimized. Therefore, this SAMP requires field sampling personnel to try to detect problems early. Then the field sampling personnel should consult the on-site field supervision, who will make the ultimate choices regarding the corrective action or actions that will be taken.

If a malfunction or problem arises, the following steps will be followed:

- Define the malfunction in the context of data validity;
- Determine who should investigate the malfunction;
- The assigned person(s) will investigate the malfunction;
- The assigned person(s) and supervision will determine the appropriate corrective action;
- Determine who should implement the corrective action;
- Determine how effective the corrective action is and implement the correction;
- Check to see if the malfunction has been eliminated by the corrective action;
- Repeat the above steps until the malfunction is eliminated.

All malfunctions and problems will be documented in a separate field log to allow review during the data validation. Items that will be recorded are:

- Name of the person who identified the malfunction;
- A statement defining the malfunction;
- The corrective action prescribed;
- The schedule for completing the corrective action;
- Signatures of each responsible party, including the field supervision.

Analytical laboratory results will be assessed for compliance with the degree of precision, accuracy, completeness and sensitivity as required as follows:

Precision of laboratory analyses will be assessed by comparing the analytical results of analytical laboratory duplicate analyses. The relative percent difference (RPD) will be calculated for each pair of duplicate analyses using the formula that appears below.

Accuracy of laboratory results will be assessed for compliance with the established Quality Control criteria that are described in the companion QAPP using the analytical results of method blanks, reagent/preparation blanks, matrix spikes samples and field blanks. The percent recovery (in %) of matrix spike samples will be calculated using the formula that appears below.

Completeness will be assessed by comparing the number of valid (usable results (as determined by a QA/QC Officer – Analytical Activities) to the total possible number of results using the formula that appears below. The completeness of laboratory analyses must be 80 percent or greater. If the completeness requirement for the project is not ultimately satisfied, the valid data will remain usable.

Reaching of targeted quantitation limits depends on instrument sensitivity and matrix effects. Therefore, monitoring instrument sensitivity is important to ensure data quality through consistent instrument performance. The instrument sensitivity will be monitored by the analysis of method blanks and calibration check samples.

Standard statistical formulas will be used to evaluate data and determine precision and accuracy.

The arithmetic mean is defined as the average obtained by dividing a sum by the number of its addends. A number of recovery results are averaged together to improve the accuracy of the measurement. The following equation will be used to determine the arithmetic mean.

Where n = number of measurements
X_i = value of measurements

The standard deviation is defined as the square root of the average squared difference between the individual values and the average value. A number of recovery results are evaluated to find the numerical variation in the data that is then used in the determination of the percent relative standard deviation. The following equation will be used to determine the standard deviation.

$$\sigma_{n-1} = \sqrt{\frac{\sum_{i=1}^{n} (X - \bar{X})^2}{n - 1}}$$

Where n = number of measurements
X_i = value of measurements arithmetic mean

The percent relative standard deviation (%RSD) is determined by dividing the standard deviation of the values by the arithmetic mean of the values and multiplying by 100. The %RSD is calculated on a series of measurements to evaluate the instrument's analytical precision (e.g., initial calibration).

The following equation will be used to determine %RSD.

$$\%RSD = (\sigma_{n\text{-}1}) \times 100 / \bar{X}$$

Where $\sigma_{n\text{-}1}$ = standard deviation
X = arithmetic mean

The percent recovery of a parameter will be determined by dividing the amount recovered by the true amount added and multiplying by 100. The percent recoveries of spiked samples are evaluated to establish the analytical accuracy of a measurement. The following equation will be used to determine the percent recovery.

$$\%R = (SSR - SR) \times 100 / SA$$

Where SSR = spiked sample result
SR = sample result or background
SA = spike added

The relative percent difference will be determined by dividing the difference between two numbers by their arithmetic mean and multiplying by 100. The RPD will determine the analytical precision of two duplicate measurements. The following equation will be used to determine RPD.

$$RPD = ((|R_1 - R_2|) / ((R_1 + R_2)/2)) \times 100$$

Where R_1 = value of the first result
R_2 = value of the second result

System or performance audits or standard QC procedures will be used to determine the need for corrective action. The necessary steps in the corrective action system will be:

1. checking to see if pre-determined limits for data acceptability have been exceeded;
2. Identifying and defining malfunctions and problems;
3. assigning responsibility for investigating a malfunction or problem;
4. investigating and determining the cause of the malfunction or problem;
5. determining a corrective action to eliminate the malfunction or problem;
6. assigning and accepting responsibility for undertaking the corrective action;
7. undertaking the corrective action and evaluating its effectiveness;
8. determining if the corrective action has eliminated the problem; and,
9. documenting the corrective action and its effect.

For each measurement system, the measurement analyst will be responsible for identifying the need for corrective action and initiating the corrective action procedure. The laboratory supervisor will be responsible for the implementation of the corrective action and evaluating its effectiveness. The laboratory QA Officer will be responsible for documenting the fact that the corrective action has resolved the malfunction or problem. The corrective action implemented will depend upon the QA/QC criteria that did not meet the necessary criteria and may range from qualifying the data to re-sampling at the site. All malfunctions and problems requiring corrective action and the corrective action employed to resolve the problem will be reported. Field corrective action will consist of repeated sampling and will be documented in the field logbook. Please refer to the LQAP and ILA provided in Attachment B-1 (to be provided when laboratory is selected) for laboratory corrective action information.

O.5 Correlation of Fixed Laboratory and In-situ Field Analytical Data

STERLING will ensure that continuous samples of soil are collected from each soil boring. STERLING will screen the samples with the PID at two-foot intervals and the sample with the greatest PID reading in the headspace will be sent for laboratory analysis. If no elevated readings are determined via the PID, then a sample at a grain size or color discontinuity will be selected for laboratory analysis. If no grain size or color discontinuity exists, then a sample will be collected at a random depth between the top and bottom. At least one sample from the middle of each boring will be analyzed at a fixed lab. A sample from the top of each boring and a sample from 6 inches above the water table or the termination of the boring, if higher, will be sent for laboratory analyses. Any PID readings above background will be considered evidence of potential contamination.

In addition, the statistical methods found in the USEPA Guidance for Data Quality Assessment Practical Methods for Data Analysis, EPA QA/G9 will be used if found to be necessary.

P.0 Quality Assurance Reporting

When conducting a Brownfields site investigation, it is essential to establish mechanisms for providing periodic reports on measurement system performance and data quality to management. These reports should always provide an assessment of measurement data in terms of PARCC, performance audit results, systems audit results, and significant QA problems along with any recommended solutions. In addition, it is prudent that these reports be prepared to include a separate QA section for the purpose of summarizing pertinent information on environmental measurement data quality.

P.1 Roles and Responsibilities

To ensure the successful outcome of any Brownfields site investigation project, it is integral for the environmental professional responsible for leading a municipality's remedial efforts to maintain close contact with the U.S.EPA Remedial Project Manager. This is necessary to ensure that pertinent information regarding the technical and financial progress of a site-specific Brownfields investigation is fully understood by all the parties which are involved. Customarily, this communication will begin upon the award of a U.S.EPA Brownfields pilot project grant. This will than necessitate the initiation of QA activities such as the development of project planning documentation.

P.2 Trip Reports

To provide a detailed accounting of what occurred during a particular sampling mobilization, trip reports are to be prepared for each site-specific Brownfields investigation. Traditionally, trip reports are to be completed within two weeks of the last day of each sampling mobilization. For the effective use of trip reports, it is important that they provide information in a timely manner by noting major events, dates, and personnel on-site (including affiliations). To facilitate these efforts, trip reports should be assembled as follows:

- Background.
- Observations and Activities.
- Conclusions and Recommendations (optional).
- Future Activities.

P.3 Project Report Requirements

A single Site Investigation Report will be prepared after the completion of all field activities and all laboratory results have been validated. In this report will be:

- descriptions of all sampling activities;
- a summary and discussion of the field screening and laboratory analytical results; and,
- recommendations for any further site investigation or remedial activities.

The following will be prepared by STERLING field sampling staff geologist and will be included as attachments to the Site Investigation Report:

- field logs;
- field screening logs;
- soil boring logs;
- chain of custodies;
- calibration logs;
- complete field screening results; and,
- complete laboratory results.

The STERLING Project Manager will ensure the report will be delivered to the City of Troy by November 21, 2003.

Q-1.0 Performance and Systems Audits

When conducting a Brownfields site investigation it is integral to perform internal, as well as, external performance and systems audits. These audits are undertaken to evaluate the capability and performance of the total measurement system comprising a Brownfields environmental monitoring network. These oversight activities are useful in ensuring that field activities are providing samples reflective of the site and its conditions.

To evaluate the accuracy of the total measurement system or component thereof, performance audits are usually undertaken periodically to assess data collection efforts. In regard to field sampling operations, this oversight function is performed to critique in-situ monitoring efforts and sample collection activities. However, for performance audits to be effective, they should be scheduled in accordance with the applicable field operations warranting oversight. Alternately, a systems audit focuses on evaluating the principal components of a measurement system to determine proper selection and use. In regard to field sampling operations, this oversight activity is performed to critique the quality control procedures which are to be employed. Systems audits of this nature are to be performed periodically, prior to or shortly after, field operations commence until the project is completed.

Q-1.1 Verification of Sampling Procedures

Reviews of the sampling activities will be conducted by the Site Supervisor or their designated substitute. The intent of these reviews will be to verify that all established procedures that are documented in the QAPP are followed. Reviews will be conducted at the beginning of site activities and at the midpoint of the field work. Each review will include an examination of proposed and actual field sampling records, field instrument operating records, sample collection frequencies and techniques, maintenance of QA procedures, and chain-of-custody documentation. The reviews will be documented in a field notebook dedicated to this purpose for easy reference during data validation. Follow-up reviews will be required to document the correction of any deficiencies and the results of such reviews will be noted in the dedicated field notebook.

Q-2.0 Data Validation

To ensure that the measurement data acquired when performing a Brownfields site investigation are of an appropriate quality, it is important to specify and follow procedures for validating all pertinent environmental monitoring results. Data validation is regarded as a systematic process for reviewing a body of results against a set of established criteria to provide a specified level of assurance concerning validity. It requires a systematic and uniform evaluation to be performed on the data to identify those results with questionable quantitative value.

The approach for performing data validation should always be independent of the data production effort, and objective in its application. In most instances, the criteria for validating data will include conducting checks for internal consistency, reviews for transmittal errors, and/or audits for verifying laboratory capability. This will typically involve interpreting the results of external performance audits such as split sample, duplicate sample (field and laboratory), spiked sample, and initial calibration determinations. In conjunction, the assessment of detection limit studies, intra-laboratory comparisons, inter-laboratory comparisons, tests for normality, tests for outliers, and data base entry checks may also be undertaken.

Q-2.1 Data Verification and Validation Requirements

Field screening and laboratory data will be reviewed to verify conformance with this plan's requirements for data quality. The QA/QC results will be reviewed to verify that the duplicate samples, trip blanks, equipment blanks, and matrix spike/matrix spike duplicates met the acceptance criteria listed in Form M. Failure to meet these requirements will result in uncertainties in data usability (see Form R). Additional steps to verify data quality will be:

- The complete data package received from the laboratory will be reviewed for completeness, correctness and contractual compliance. The following will be ensured:
  - All samples will be accounted for;
  - The required analyses were performed for each sample;
  - QA/QC sample results are provided; and,
  - Data transcription is free of errors.

- The QC package received from the laboratory will be reviewed to verify that it includes all of the elements listed in Form N (narrative description of any issues or problems encountered in extracting and analyzing the samples, organic surrogate recoveries, laboratory control sample recoveries, method blank results, MS/MSD results for organic analyses, and laboratory duplicate/spike sample results for inorganic analyses). Should any of these elements be missing from the QC data package, STERLING will request the information from the selected laboratory. A complete copy of the laboratory results and QC data package will be included in the final Phase II ESA report as an attachment. The QA/QC review, including the results of the data verification and validation, will be discussed in the final report. The conclusions and recommendations made in the report will be qualified to the degree that uncertainties about the validity of the sampling results are determined.

Additionally, the data will be reviewed to determine if the requirements of the site assessment have been met, including:

- Assess soil quality in each area of concern to determine if, and where, there are any exceedances of the NYSDEC TAGM 4046 Soil Cleanup Objectives.
- Determine if the levels of contaminants in soil are sufficient that, in light of the planned redevelopment activities, certain recommendations for remedial activities must be made.

To ensure that the data meet the needs of the SAMP and the site assessment, the following steps will be followed:

- STERLING will subcontract with a selected data validator to perform the data validation for the SAMP. Data validation will follow the procedures outlined in the CLP Protocol SOP No. HW-6: CLP Organics Data Review and Preliminary Review, SOP No. HW-2: Evaluation of Metals Data for Contract Laboratory Protocol, and the USEPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis.
- Review the corrective action log and the sampling review log to assess whether there were significant anomalies or problems with the data collection.
- Tabulate all field screening and laboratory data on a site map to verify that the results are consistent and reasonable based on knowledge of past site activities.
- Verify that a minimum of 90 percent of the laboratory analyzed samples were validated and deemed acceptable by the laboratory.
- Verify that the QA/QC criteria for the duplicate samples and blanks were met.

Q-2.1.1 Fixed Laboratory Confirmatory Data Verification and Validation Requirements

STERLING will subcontract with a selected data validator to perform the data validation for the SAMP. Data validation will follow the procedures outlined in the CLP Protocol SOP No. HW-6: CLP Organics Data Review and Preliminary Review, SOP No. HW-2: Evaluation of Metals Data for Contract Laboratory Protocol, and the USEPA Guidance for Data Quality Assessment, Practical Methods for Data Analysis. Full data validation will be performed on 20 percent of the laboratory samples.

The laboratory deliverable package will conform to the USEPA –Contract Laboratory Protocol OLMO 4.2 for organic analytes and the USEPA – Contract Laboratory Protocol ILMO 4.1 for the inorganic analytes.

Q-2.1.2 In-situ Field Analytical Data Verification and Validation Requirements

Data verification and validation of the in-situ field analytical equipment will be performed in the following manner:

- All field logs will be reviewed for accuracy and unusual conditions.
- The corrective action log and the sampling review log will be reviewed to assess whether there were significant anomalies or problems with the data collection.
- All field screening data will be depicted on a site map to verify that the results are consistent and reasonable based on the known information about past site activities.
- The field data will be reviewed to verify that it is consistent with the laboratory data via the relative percent difference method.

R.0 Data Quality Assessment

When performing a Brownfields site investigation, it is essential to correlate validated measurement data for reconciliation with the acceptance/performance criteria specified for the project. This will involve rendering a determination to ascertain whether measurement data are of the right type, quality, and quantity required to support environmental decision making efforts. To perform this activity, scientific and statistical procedures must be employed to provide an assessment.

The technique for determining if validated measurement results are adequate for their intended use is known as the Data Quality Assessment (DQA) process. The DQA process can provide information to enable a decision maker to draw conclusions about the strength of evidence depicted by a set of collected measurement data. To assist in these efforts, an outline of the formal DQA process is described in the U.S.EPA Guidance for Data Quality Assessment: Practical Methods for Data Analysis. As previously noted, this guide is included as an attachment to this generic QAPP boilerplate.

R.1 Data Quality Assessment Process

The DQA process is both a scientific and statistical evaluation technique which consists of the following five steps:

- Review project acceptance/performance criteria and sampling design.
- Conduct a preliminary data review.
- Select a statistical test (i.e., Shaprio-Wilk W test, Student's t-Test, etc.).
- Verify the assumptions of the selected statistical test.
- Draw conclusions from the data.

Even if the formal DQA process is not followed in its entirety, a systematic assessment of measurement data quality should always be performed when conducting a Brownfields site investigation. This systematic process will involve carrying out the following data assessments:

- Validating all pertinent measurement data for scientific anomalies.
- Correlating all pertinent measurement data to the PARCC parameters designated for the project.
- Identifying measurement data trends and outliers.

In doing so, one can assimilate an abstract estimation of data "worth" to provide Brownfields stakeholders with a rationale for making proper decisions.

R.2 Data Usability/Reconciliation Requirements

All of the field screening results and laboratory data will be included in the final Phase II ESA report. Any questions on the usability of the data that come to light in the data review will be described in the report. The conclusions and recommendations made in the report will be qualified if there are uncertainties about the validity of the sampling results. All fixed laboratory data will be compared to the NYSDEC TAGM #4046

Soil Cleanup Objectives. The report will include a discussion of the usability of the field and fixed laboratory data based upon the data validation/usability evaluation described above.

FIGURES

ATTACHMENT A

SAMPLER'S GUIDE TO THE CONTRACT LABORATORY PROGRAM

ATTACHMENT B

PHOTOVAC MODEL 2020 INSTRUMENT MANUAL

ATTACHMENT C

FIELD SCREENING WITH A PHOTOIONIZATION DETECTOR
SOP #6

ATTACHMENT D

SOIL SAMPLING
SOP #2

ATTACHMENT E

SAMPLING EQUIPMENT DECONTAMINATION
SOP #3

ATTACHMENT F

CONTAINMENT AND DISPOSAL
SOP #7

ATTACHMENT G

SAMPLE PRESERVATION, CONTAINERS, HANDLING & STORAGE
SOP #4

ATTACHMENT H

SAMPLE QUALITY CONTROL
SOP #8